

TECUMSEH POWER PRODUCTS

LAUSON-POWER PRODUCTS DIVISION

Tecumseh Products Co.

Grafton, Wisconsin

A number of small trolling and fishing motors are powered by versions of the Tecumseh-Power Products, V51 or V61 engine covered in this section. Specifications and overhaul procedures are similar for all Tecumseh power heads, but parts are not interchangeable. The exact Tecumseh or Power Products Type Number must be given when ordering service parts, to be sure the correct parts are obtained. In some cases, power head parts are distributed by the outboard motor manufacturer. In many cases, parts are distributed by Tecumseh Products Company, and their Central Parts Distributors and Dealers. If the name and address of the nearest dealer is not known, refer to Central Parts Distributor listing at end of this section, and contact nearest distributor for dealer name and address. The Tecumseh or Power Products type number is stamped on the power head in one of the locations shown in Fig. T1.

CONDENSED SERVICE DATA

TUNE-UP	V51	V61
Model		
Hp @ rpm.....	4 @ 4400	5.5 @ 4400
Bore — Inches.....	2	2.09
Stroke — Inches.....	1 $\frac{5}{8}$	1.769
Number of Cylinders.....	1	1
Displacement Cu. In.	5.1	6.1
Spark Plug		
Champion.....	J4J	L4J
AC.....	M42K	
Autolite.....	A21X	
Electrode Gap.....	0.030	0.030
Magneto Point Gap.....	0.020	0.020
Magneto Timing.....	See Text	See Text
Carburetor Make.....	Own	Own
Carburetor Adjustment.....	See Text	See Text
Fuel-Oil Ratio.....	16:1*	16:1*

*Unless otherwise instructed by motor manufacturer.

SIZES — CLEARANCES

Piston Rings		
End Gap.....	0.006-0.011	0.006-0.011
Side Clearance.....	0.0015-0.003	Top 0.003-0.005 Bottom 0.002-0.004
Piston Pin		
Diameter.....	0.3750-0.3751	0.4997-0.4999
Piston Skirt Clearance.....	0.0049-0.006	0.0047-0.006
Crankshaft Diameter		
Upper Main Bearing.....	0.7495-0.750	0.7500-0.7505
Lower Main Bearing.....	0.9995-1.000	0.9995-1.000
Crankpin.....	0.6860-0.6865	0.5010-0.5014

TIGHTENING TORQUES

(All Values in Inch-Pounds Unless Noted)

Connecting Rod.....	40-50	40-50
Crankcase Halves.....	35-40	35-40
Cylinder to Crankcase Nuts.....	70-75	70-75
Cylinder Head.....	50-60
Inlet Manifold.....	70-75	70-75
Flywheel.....	216-300	216-300
Spark Plug.....	216-264	216-264

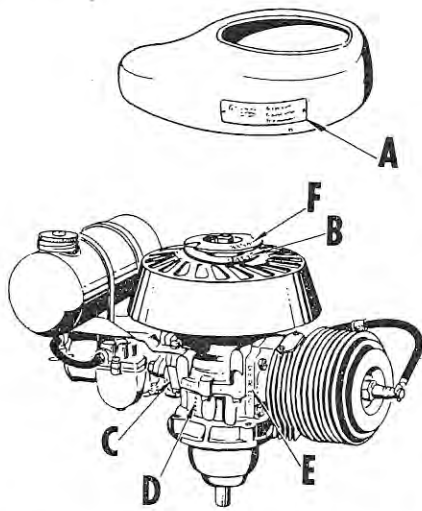


Fig. T1 — On Power Products power heads or engines the Serial Number and Type Number may be in one of several locations. Type Number will be required for parts procurement.

- A. Nameplate on Shroud
- B. Plate on Flywheel
- C. Plate on Crankcase
- D. Stamped on Crankcase
- E. Stamped on Cylinder Flange
- F. Stamped on Pulley

LUBRICATION

The power head is lubricated by oil mixed with the fuel. Follow the recommendations of the motor manufacturer, if known. If manufacturer's recommendations are not known, mix 1/2 pint of a good grade Outboard or Two Cycle oil with each gallon of regular gasoline. If Outboard or Two Cycle oil is not available use SAE 30, Type MM, Automotive motor oil. Do not use cheaper grades of oil or a highly detergent automotive oil.

FUEL SYSTEM

CARBURETOR. A Tecumseh or Power Products gravity feed, diaphragm type carburetor is used. Refer to Fig. T2.

On some early models, the high speed mixture adjusting screw (9) and idle mixture adjusting screw (10) are interchangeable. On later models, the idle mixture adjusting screw was changed slightly, and head knurled for identification. On carburetors with identical mixture adjusting screws, initial setting for either mixture adjusting screw is 3/8 turn open from the closed position. On carburetors with knurled idle mixture adjusting screw, initial setting for either screw is 1 turn open. Final adjustment must be made under load with motor at operating temperature. Back the idle speed stop screw (11) out of body until throttle valve will completely close. With throttle valve closed, turn screw (11) clockwise until it contacts throttle lever, then continue turning 1/4-turn to barely open throttle valve. NOTE: When making the idle speed setting adjustment, make sure cam

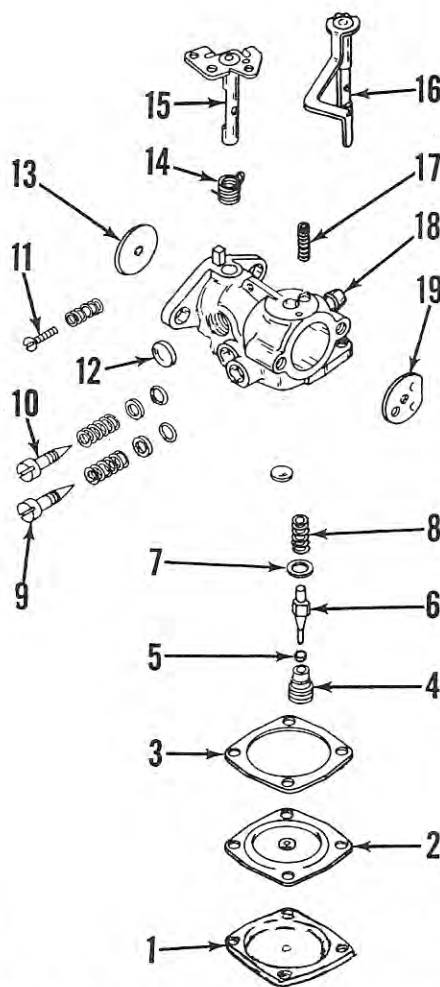


Fig. T2—Exploded view of Power Products, gravity feed, diaphragm carburetor used.

- | | |
|-----------------------------|------------------------|
| 1. Cover | 10. Idle mixture screw |
| 2. Diaphragm | 11. Idle speed screw |
| 3. Gasket | 12. Welsh plug |
| 4. Inlet valve seat | 13. Throttle valve |
| 5. Inlet valve | 14. Throttle spring |
| 6. Inlet valve plunger | 15. Throttle shaft |
| 7. Gasket | 16. Choke shaft |
| 8. Inlet valve spring | 17. Positioning spring |
| 9. High speed mixture screw | 18. Carburetor body |
| | 19. Choke valve |

follower on throttle arm is not contacting synchronizing cam on models so equipped. Readjust synchronizing cam as outlined in SPEED CONTROL LINKAGE paragraphs.

When disassembling the carburetor, keep in mind that the mixture adjusting screws (9 and 10) are spring loaded and sealed with an "O" ring. The inlet needle valve assembly is also spring loaded. Removal of inlet valve seat (4) requires the use of a blade screwdriver which has been modified by grinding a center slot to clear tip of plunger (6).

Clean all metal parts in a suitable cleaner and reassemble using new gaskets and seals. The Welsh plug (12) can be removed if necessary, for cleaning idle passages. To remove the plug, drill a small hole off-center through plug, and pry out with a suitable tool. Be careful not to damage the carburetor body.

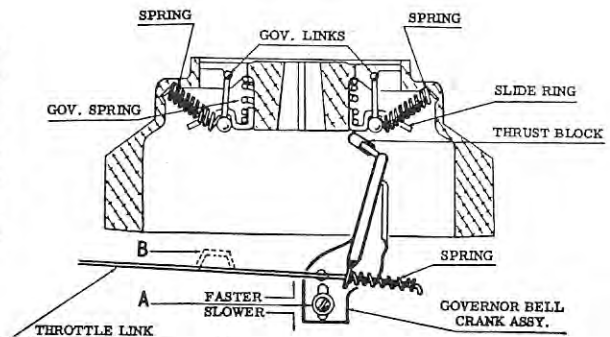
When reassembling, install diaphragm (2) with large metal disc toward carburetor body. Install throttle valve (13) with short, stamped line toward the top, and visible with throttle closed. Install choke plate (19) with raised detents to the inside and parallel with choke shaft (16).

Remove and examine reed plate and valves while carburetor unit is off. Tighten the retaining stud nuts to a torque of 70-75 inch-pounds when installing carburetor.

SPEED CONTROL LINKAGE. Two types of speed controls have been used. On some early models, the ignition timing mechanism is fixed in position, and a flywheel mounted governor is used as shown in Fig. T3.

GOVERNED MODELS. Major speed adjustment is made by loosening the retaining screw (A—Fig. T3) and moving governor bellcrank assembly toward or away from flywheel as shown. Make minor speed adjustments by bending throttle link as shown at (B). NOTE: Remove link before bending, to avoid damage to remainder of governor linkage. A speed limiting device is incorporated into the magneto breaker box on most governed models. This unit grounds the magneto at 4500-4700 rpm, thus limiting the top speed. Refer to Fig. T4 for an exploded view of breaker box with overspeed mechanism. Plunger (5) must be installed

Fig. T3—Schematic view of centrifugal governor used on some models. Make major speed adjustment by raising or lowering bell crank at (A). Make minor adjustment by bending link (B).



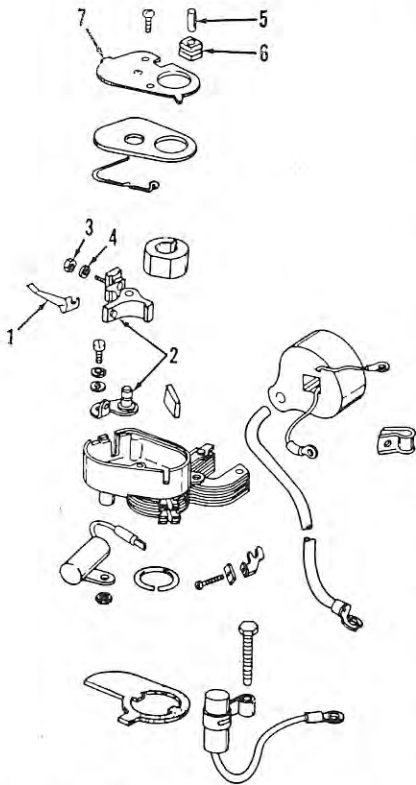


Fig. T4 — Overspeed governor used with centrifugal governor on some models. Refer to text.

with rounded end up if it is removed. When throttle is in wide-open position, the thrust block on throttle bellcrank must clear brecker box by not more than $\frac{1}{16}$ -inch nor less than $\frac{1}{32}$ -inch.

SYNCHRONIZED MODELS. On most models, the ignition timing is advanced by the speed control lever as shown in Fig. T5; and throttle lever is operated by a synchronizing cam attached to magneto stator mounting plate. To synchronize the throttle, first make sure that magneto is correctly installed and points adjusted as outlined in

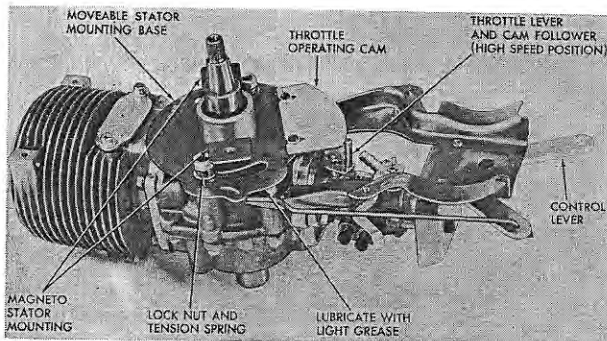


Fig. T5 — On some models, ignition timing is adjustable and synchronized with throttle as shown.

IGNITION paragraphs. Move speed control lever to "FAST" position. Loosen the two screws retaining synchronizing cam to stator mounting plate, move throttle lever to wide-open position, and slide the cam on mounting screws until edge of cam is firmly in contact with cam follower on throttle arm. Tighten the cam retaining screws and move speed control lever to "SLOW" position. With lever in "SLOW" position the carburetor throttle lever should contact the stop screw (11—Fig. T2) and synchronizing cam should contact cam follower on throttle arm. Make minor adjustments as necessary, so that synchronizing cam is in contact with cam follower throughout speed range, and so that carburetor throttle valve fully opens and fully closes at the two extremes of speed range setting.

REED VALVES. The reed plate is retained to crankcase by the carburetor mounting studs. Reed plate should be examined whenever carburetor is removed for service. The reeds should lie perfectly flat on reed plate, with no more than 0.005 clearance at any point. Check for broken reeds, cracks or distortion. On V51 models the reed plate assembly is serviced only as a complete unit. If condition is questionable, renew the assembly. Renew mounting gasket whenever reed plate has been removed. On V61 models the reed plate, reeds, reed stop and baffle are available as service parts.

IGNITION

Breaker contact gap is usually 0.017-0.020, and can be adjusted after removing blower shroud and/or fuel tank, and flywheel. Phelon and Tecumseh magnetos have been used. The correct point gap is stamped on body of magneto and the specific recommendations should be followed.

On governor equipped models, the timing position is stationary. To time the magneto,

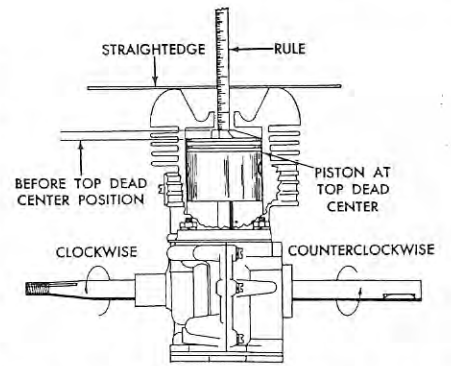


Fig. T6 — On models with fixed timing, piston position can be measured as shown for correct ignition timing.

adjust the points to recommended gap, and rotate crankshaft until piston crown is $\frac{11}{64}$ -inch before TDC when measured as shown in Fig. T6. With crankshaft in this position, rotate stator plate until points just begin to open, then lock in place.

On synchronized models without governor, refer to Fig. T7. When installing magneto stator to mounting plate, first install the screws loosely, then turn stator fully in a clockwise direction as shown, and tighten the clamp screws securely.

On late models with Tecumseh magneto, a condenser may or may not be used in connection with the breaker points. On models without a condenser, capacitance is built into the magneto coil, and a condenser is not required. The magneto coil furnished as repair parts for all Tecumseh magnetos may or may not require the use of a separate condenser. Specific instructions are included with the replacement coil, and should be followed carefully.

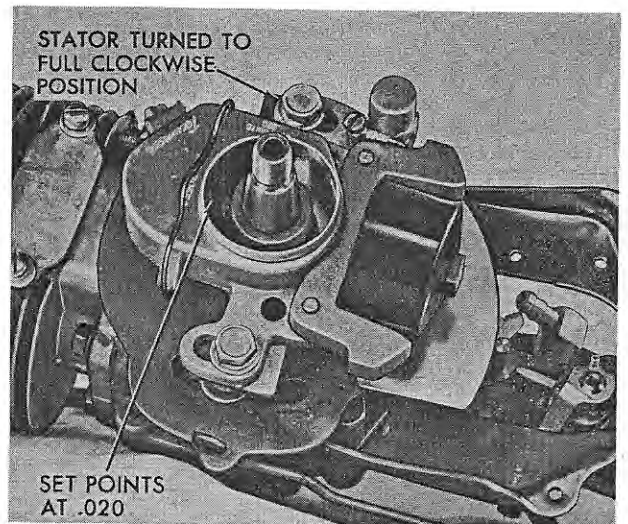


Fig. T7 — Magneto installation on some models with synchronized controls. Refer to text.

POWER HEAD

DISASSEMBLY. Model V51 (4 hp) power heads use a closed end cylinder as shown in Fig. T8. Model V61 (5.5 hp) units have a detachable cylinder head (34—Fig. T9), a needle roller lower main bearing (35) and other differences apparent on examination or on reference to Figs. T8 and T9. These differences will be noted where they materially alter overhaul procedure.

To disassemble the power head, remove flywheel, magneto, carburetor, spark plug, transfer port cover (or plug); and any other components which are accessible and more easily removed while cylinder and crankcase is assembled. The cylinder head screws on V61 power heads are installed with LOCTITE; it may be necessary to heat the screw heads with a soldering iron or other method to break the sealant bond.

Scribe correlation marks on cylinder and crankcase for convenience in assembly, remove the stud nuts, and carefully withdraw cylinder from the piston. On V51 power heads, piston and connecting rod assembly can be removed from crankshaft at this time by removing connecting rod screws and cap. On V61, removal is more convenient after disassembly of crankcase, because of difficulty of access to connecting rod screws. Crankcase halves can usually be separated after removal of screws. Check to be sure all screws, reed plate gasket, cylinder gasket, etc. are removed; then tap lightly with a soft hammer if stuck. DO NOT use a pry in separating the crankcase halves.

ASSEMBLY. Because of the two-cycle design, crankcase must be completely sealed against vacuum and pressure. Whenever power head is disassembled, it is recommended that all gasket surfaces and the mating surfaces of crankcase halves which do not use a gasket, be carefully inspected for nicks, burrs or warped surfaces which might interfere with a tight seal. Flatness can be checked and slight irregularities removed by using a sheet of No. 00 emery paper, or lapping compound, on a lapping block or sufficiently large piece of smooth plate glass. Apply very light pressure and use a figure-eight motion, checking frequently to determine progress. Only high spots must be removed. Do not lower the surface. Finish lap using lapping compound or worn emery paper; then thoroughly clean the parts with new oil on a clean soft rag. Wash with soapsuds and clean rags to make sure all metal filings, lapping compound or emery dust are completely removed.

Refer to the appropriate paragraphs for inspection and reassembly of power head components. Apply a thin coating of hardening sealant to mating surfaces of crankcase halves and carefully assemble by reversing the disassembly procedure. Use new gaskets and do not use gasket cement, on joints using gaskets. Before tightening the screws joining the crankcase halves, check carefully at the joints where cylinder and reed plate attach. The joints must be flat

1. Cylinder
2. Transfer port cover
3. Flywheel
4. Magneto cam
5. Magneto
7. Synchronizing cam
8. Cutoff clip
9. Stator mounting arm
10. Control link
11. Bracket
12. Snap ring
13. Retainer
14. Seal
15. Crankcase
16. Inlet reed valve

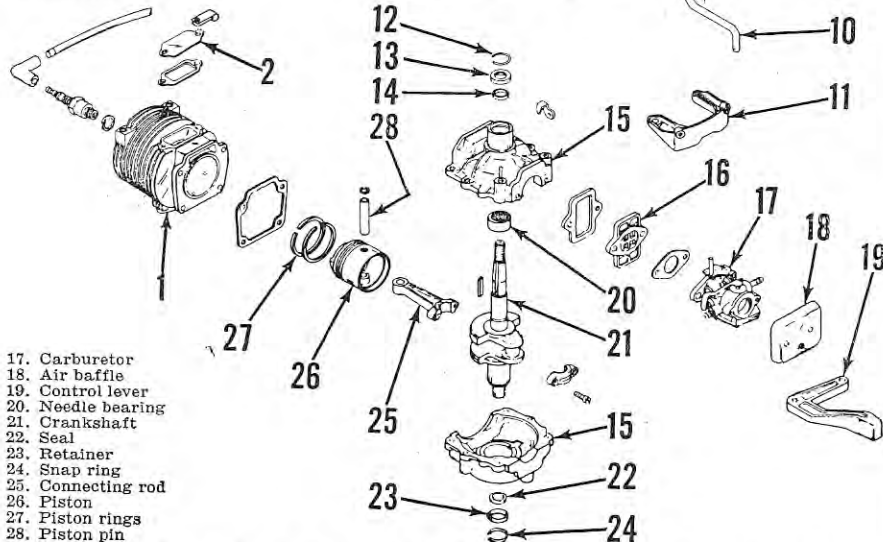


Fig. T8 — Exploded view of late, Model V51 power head especially designed for outboard motor application.

1. Cylinder
2. Transfer port plug
3. Flywheel
4. Magneto cam
5. Magneto
7. Synchronizing cam
9. Stator mounting bracket
11. Bracket
12. Snap ring
13. Retainer
14. Seal
15. Crankcase
16. Reed plate
17. Carburetor
21. Crankshaft
22. Seal
23. Retainer
24. Snap ring
25. Connecting rod
26. Piston
27. Piston rings
28. Piston pin
29. Adapter plate
30. Valve reeds
31. Reed stop
32. Baffle
34. Cylinder head

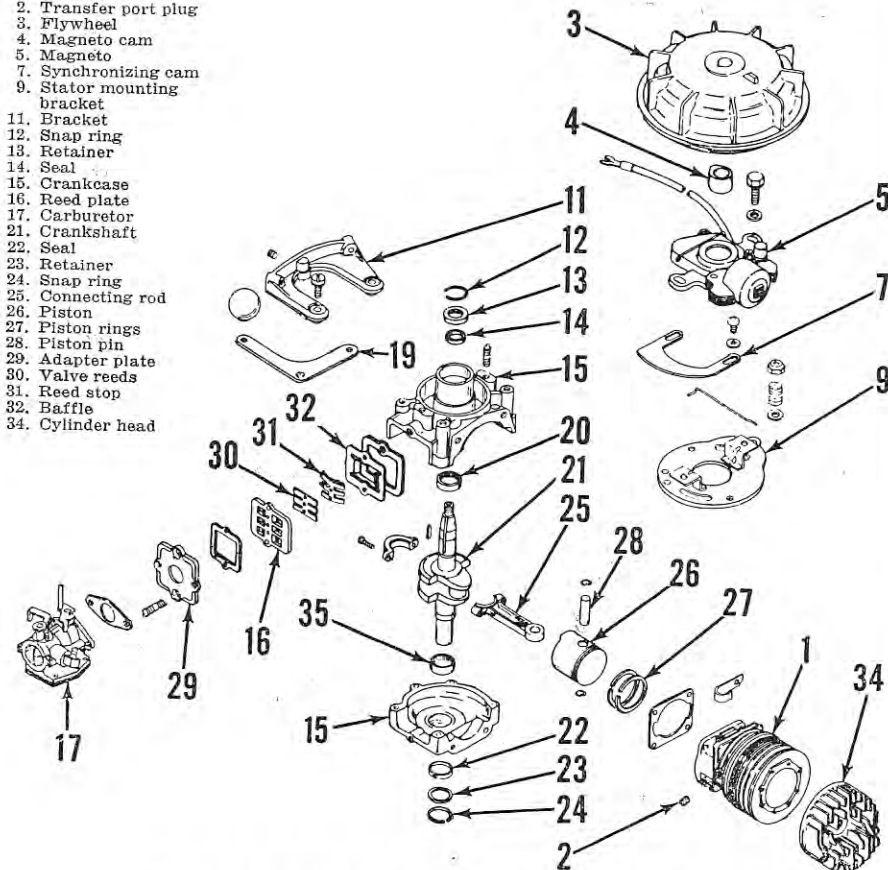


Fig. T9 — Exploded view of power head used on V61 models.

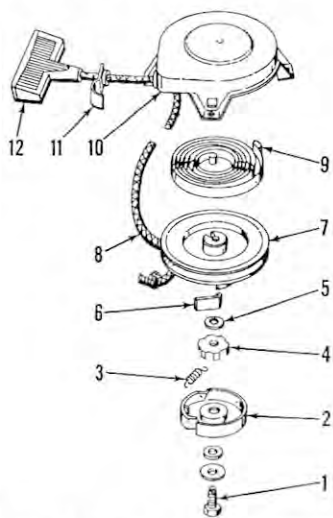


Fig. T10 — Exploded view of recoil starter typical of that used on most models.

- | | |
|--------------|------------------|
| 1. Cap screw | 7. Sheave |
| 2. Retainer | 8. Rope |
| 3. Spring | 9. Recoil spring |
| 4. Brake | 10. Housing |
| 5. Washer | 11. Rope guide |
| 6. Pawl | 12. Handle |

and smooth to provide a good mounting surface for cylinder and reed plate. After aligning the crankcase halves, tighten the retaining screws to a torque of 35-40 inch-pounds.

PISTON, PIN, RINGS AND CYLINDER. Before detaching rod from crankshaft, check the correlation marks on rod and cap. If rod and cap are not marked, scribe a line to indicate proper assembly position.

Model V51 (4 hp) power heads, use an aluminum piston with a deflector cast into piston crown. The piston must be installed in power head with long, sloping side of deflector downward toward the exhaust ports. The two piston rings are identical, and should have an end gap of 0.006-0.011 in the cylinder. Side clearance in piston grooves should be 0.0015-0.003. Recommended piston to cylinder wall clearance is 0.0049-0.006. Oversize pistons, rings and cylinder are not available, renew the units if excessively worn or otherwise damaged.

On V61 power heads, piston has a flat crown. Lower edge of piston skirt is cut out slightly on one side. The cut out side must be installed toward transfer port side of cylinder. The two piston rings are identical,

however, top ring groove is approximately 0.001 wider than lower groove, allowing a slightly greater side clearance for top ring. Piston rings should have an end gap of 0.006-0.011. Top ring should have a side clearance of 0.003-0.005, and bottom ring a side clearance of 0.002-0.004 in their respective piston groove. Recommended piston to cylinder wall clearance is 0.0047-0.006. Piston, rings and cylinder are available in standard size only.

The piston pin is retained in piston by a snap ring. Piston pin should have a tight, thumb push fit in piston at room temperature, and a slightly looser fit in connecting rod.

CONNECTING ROD, BEARINGS AND CRANKSHAFT. The connecting rod is unbushed. A properly installed connecting rod should not drop of its own weight when raised to a horizontal position, but should turn freely without binding on shaft. Rod to shaft clearance may be reduced by filing rod and/or cap, providing not more than 0.002 of metal is removed.

Crankshaft main bearing journals should not be out-of-round or tapered more than 0.0005. Connecting rod journal should not be out-of-round or tapered more than 0.001. Refer to condensed service data for journal dimensions. Upper main bearing is of needle roller type on all motors. A needle roller lower main bearing is used on all V61 motors while crankshaft rides directly in unbushed crankcase on V51 models. Renew upper and lower crankshaft seals whenever crankcase is disassembled.

MANUAL STARTER

Recoil starters similar to the one shown in Fig. T10 are used on most models. The impulse starter shown in Fig. T11 may be used.

To overhaul the recoil starter, remove and invert the assembly. Pull starting rope until notch in rope pulley is aligned with rope eyelet in housing. Hold pulley with notch so aligned by grasping pulley and housing firmly; and feed rope into inside of housing until enough slack is obtained to unwind two turns of rope from pulley groove. Slowly release pulley and allow recoil spring to completely unwind. Remove pulley retaining screw (1—Fig. T10) and withdraw pulley assembly, making sure recoil spring (9) remains in recess in pulley. When reassembling, pre-load the recoil spring (9) two full turns when handle (12) is resting against rope guide (11).

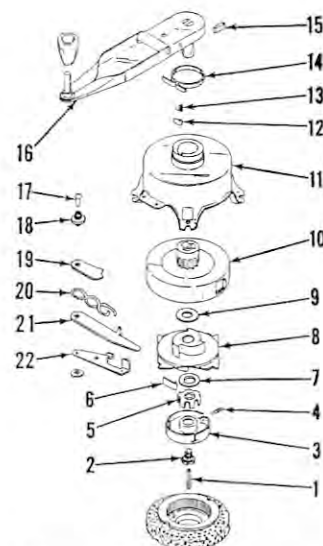


Fig. T11 — Exploded view of impulse starter used on some models.

- | | |
|---------------------|-------------------|
| 1. Centering pin | 12. Lock dog |
| 2. Brake screw | 13. Spring |
| 3. Retainer | 14. Clip |
| 4. Spring | 15. Pawl |
| 5. Brake | 16. Handle |
| 6. Dog | 17. Pin |
| 7. Washer | 18. Bushing |
| 8. Cover | 19. Release dog |
| 9. Washer | 20. Spring |
| 10. Spring & keeper | 21. Release lever |
| 11. Housing | 22. Release lock |

To disassemble the impulse starter shown in Fig. T11, first pull release lever (21) and allow spring to unwind; then, unbolt and remove starter assembly from power head. Remove centering pin (1) and brake screw (2). NOTE: Brake screw (2) has a left-hand thread. Note the position of spring (4) with relation to cover (8), while lifting off retainer (3). When retainer is removed, check to see that brake (5) is friction tight on hub of retainer (3) and check starter dog (6) for wear. Spring and keeper assembly (10) is available only as an assembly and should not be disassembled. Clean the parts thoroughly, renewing any which are damaged or worn. Lock dog spring (13) should hold lock dog (12) firmly away from wall of hub in housing (11). Coat the parts with a light, waterproof grease when reassembling, and make sure that lock dog (12) engages notches in spring and keeper assembly (10).

Be sure centering pin (1) is in place when starter assembly is reinstalled on power head.

CENTRAL PARTS DISTRIBUTORS

Birmingham Electric Battery Co.
2230 S. Second Ave.
Birmingham, Alabama

Jones Battery & Electric
318 W. Jefferson
Phoenix, Arizona

555, Inc.
711 W. 8th St.
Little Rock, Arkansas

Frank Edwards Co.
1541 Adrian Rd.
Burlingame, California

Electric Equipment Co.
1611 S. Hope St.
Los Angeles, California

Spitzer Ind. Products Co.
43 W. Ninth Ave.
Denver, Colorado